than a few days at a time. The Weather Bureaus at Washington and Lisbon will, of course, do all that they can, but the most that can now be done is to observe the weather in 1899, in the hope of getting some new light on the matter.

So far as the eclipse is concerned, which will certainly take place at the predicted time, it is possible and practicable to make calculations from the data in our American Ephemeris, and to do this within a few days, and in the coming months to make all needful preparations of instruments and training of observers, and with abundant spare time left.

I shall report to our trustees that the main effort to be made then will be towards photographing the eclipse as well and completely at both points as the time, short enough at best, will allow.

At Norfolk, in Virginia, and Ovár, in Portugal, the eclipse will be total long enough to be well photographed by instruments costing but little more than a hundred dollars for each station, instruments which can be made useful in several directions and can be readily placed at either station. The advantage of making the effort to observe at both places will be, of course, not that of making observations at the same time, but that of following out a uniform set of rules both in America and in Europe.

These rules can be readily formulated and practiced beforehand with comparatively little trouble, provided the astronomers can come to an agreement, which I think will be an easy matter.

The process of taking the photographs is so easy now that no difficulty will arise from this, and it will also be easy to train intelligent students into the necessary physical manipulations, with the help, at least, of the necessary photographers, who, I presume, will be readily brought to either station.

As the object of the present paper is merely to indicate what is to be done, I shall defer to another occasion any further details. In this, as in many other problems of practical astronomy, the main requirement is merely to indicate in common language the problems to be solved, and it will be sufficient to leave further consideration of the matter to another occasion.

Truman Henry Safford.

RECEPTION AND EXHIBITION OF THE NEW YORK ACADEMY OF SCIENCES.

The Annual Reception and Exhibition of the New York Academy of Sciences has come to be one of the most interesting social events of the scientific circles of the city. This fine spring weather and a beautifully suitable hall combined with the zeal of the exhibitors to furnish instructive entertainment to about three thousand persons. The reception was held, as usual, at the American Museum of Natural History, the first evening being reserved for members, exhibitors and special friends, and some 500 availed themselves of this opportunity to become better acquainted with their fellow members, and to see and discuss the advances in branches of science other than their own. Indeed, the justification and benefits of these exhibitions are to be sought quite as much in their broadening influence upon the point of view of specialists as in their possibilities for the layman and amateur.

The Museum authorities are exemplary in their hospitality, and the relations between this gigantic object lesson in science and the Academy are yearly growing more cordial. This year it was possible to hold the reception in the new hall of American Anthropology, west of the entrance on the main floor. The room is finished, but is not yet occupied by cases and permanent fixtures. A more suitable and appropriate location for a scientific reception it would be hard to imagine.

The General Committee in charge of the various sections were as follows :

Anatomy: Jos. S. Blake.
Astronomy: J. K. Rees.
Botany: C. C. Curtis.
Chemistry: Charles A. Doremus.
Electricity: Geo. F. Sever.
Ethnology and Archæology: L. Farrand.
Experimental Psychology: Chas. H. Judd.
Geology and Geography: J. F. Kemp and R. H. Cornish.
Mineralogy: A. J. Moses.
Paleontology: Gilbert van Ingen.
Photography: Cornelius Van Brunt.
Physics: C. C. Trowbridge.
Zoology: Gary N. Calkins.

While the display was not marked by any one prominent object, such as X-rays, still it was characterized by an excellent average of exhibits of sterling value, and should give its visitors an illustration of scientific interest as distinct from the spectacular.

It would, of course, be too prolix to attempt to give anything more than a few of the typical objects enumerated in the catalogue of some twenty pages.

The exhibit in Anatomy, though small in space, contained examples of most interesting points. The variations in the vermiform appendix, in the hepatic artery, etc.

The Harvard, Lick and Yerkes Observatories joined with that of Columbia in making the department of astronomy thoroughly representative of the recent interesting advances in that subject. Saturn's new moon, the new planet Eros, the rotation of the sun as shown in the Johns Hopkins spectra, the variation of latitude, vied with one another for popular favor.

The Bronx Park Botanical Garden contributed much interesting material to the Section of Botany, which contained some twenty titles.

In Chemistry popular interest seemed about equally divided between Munroe's illustrations of the effects of dynamite, smokeless powder and phenyldimethylpyrazolonesulphonates.

Ethnology showed Eskimo property marks, British Columbia baskets, a new hieroglyphic writing from Mexico, and other objects of almost equal interest.

Photometry, illusions, binocular rivalry, accuracy of movement and endurance were the objects of measurements in psychology.

Under Geology and Geography were shown recent work of the U. S. Geological Survey, the Maryland and the New York State Surveys, including the Geologic model of the Yellowstone National Park made by the U. S. Geological Survey to go to the Paris Exposition, and a relief map of the Adirondack Region made by Merrill. A suite of crude petroleums and several others of interesting rocks, together with large thin sections (three inches square) of rocks, furnished interesting material for the geologist and petrographer.

Mineralogy made a bewildering display of beautiful and interesting minerals and apparatus, with examples of photo-micrographs and photographs with uranium rays.

Physics presented grating spectra from Johns Hopkins, illustrating rotation of sun, effect of pressure upon the arc spectra, Zeeman effect and coincidence of metallic and Fraunhofer lines, special colorimeters, distillation apparatus, Crookes tubes, abbreviated continuous mercury vacuum pumps, a special arc light and audimeter, the effect of an alternating magnetic field upon a lamp filament, line screens for color photography, a complete set of apparatus for research in Hertz waves and wireless telegraphy, a low resistance and a standard-comparison Wheatstone bridge, apparatus used in measuring specific heat and temperature at mines 200 degrees Centigrade, also the new Dudley strematograph with results of its use in measuring stresses in railroad rails under moving trains.

Among many interesting exhibits in Pale-

ontology the magnificent limbs of four monstrous dinosaurs commanded special attention.

Similarly in Zoology the beautiful new case illustrating the nesting habits of the brown pelican rather out ran in popular favor other objects of great scientific interest.

As may be inferred even from the above brief and unsatisfactory sketch, the exhibition was as wide in its scope as it was scientifically interesting in its details. It must have been seen to be appreciated, and the thanks of those who did see it are due to the zeal of the exhibitors, especially those out of town, among whom should be mentioned Princeton, Harvard, Johns Hopkins and Chicago Universities, Lick and Yerkes Observatories, the United States, Maryland and New York Surveys.

William Hallock,
Chairman of Committee.

SCIENTIFIC BOOKS.

Lectures on the Evolution of Plants. By Douglas Houghton Campbell, Ph.D., Professor of Botany in the Leland Stanford Junior University. New York, The Macmillan Company. 1899. 12mo. Pp. viii + 319.

Professor Campbell is probably the foremost of the small group of what may be termed the philosophical botanists in America, and he is, no doubt, better prepared to discuss the questions taken up in this book, at least in so far as they deal with the archegoniates and seed plants, than any other of our students of plants. Some years ago he brought out his book 'The Structure and Development of the Mosses and Ferns,' in which he treated the subject in such a modern way as to give new meaning to what had to too great a degree been mere dry detail. In no uncertain words he traced the genetic relationship of group to group, and the student following him was made to feel that the fact of relationship was real and necessary, and not doubtful or shadowy.

In the little book before us the author discusses, in succession, the conditions of plant life, the simplest forms of life, algæ, fungi, mosses and liverworts, ferns, horsetails and club-mosses, gymnosperms, monocotyledons, dicotyledons, geological and geographical distribution, animals and plants, influence of environment, and at the end brings together his results in a chapter entitled 'summary and conclusions.'

We can do no better in endeavoring to give our readers an idea of the author's treatment and conclusions than to quote a sentence here and there from his final chapter, as follows: "All plants agree closely in their essential cell structure, the typical cell having a cellulose membrane and a single nucleus." "The lowest plants are mainly aquatic, and it is exceedingly probable that this is the primitive condition of plant life." "The peculiar group of motile green algæ, the Volvocineæ, probably represents more nearly than any existing forms the ancestral type of all the higher green plants. These ciliated algæ are also probably related to certain colorless flagellate Infusoria, which in turn may represent the starting-point for the whole group of Metazoa among animals. It is not unlikely that the separation of the two great branches of organisms, plants and animals, took place among the Flagellata." "Starting with this primitive motile unicellular organism, there have evidently arisen a number of independent lines of development resulting in very divergent types of structure." "In these lowly organisms there is no clearly marked line between vegetative and reproductive cells."

"The increasing complexity of the plant body has been accompanied by a corresponding specialization of the reproductive parts." "The origin of the Phæophyceæ, or brown algæ, from free-swimming brown flagellate organisms, is by no means unlikely, and if this be shown to be the case they must be considered as a line of development parallel with the Chlorophyceæ, rather than an off-shoot from these." "The relationship of the fungi is still an open question." "The ancestors of the higher green plants must be sought among the simple fresh-water green algæ. The genus *Coleochæte*, the most specialized of the Confervaceæ, is the form which shows the nearest analogy with the lower